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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,585	04/09/2004	Aamod Khandekar	030304	1901
23596 7590 08/22/2008 QUALCOMM INCORPORATED 5775 MOREHOUSE DR. SAN DIEGO, CA 92121				
EXAMINER				
MALEK, LEILA				
ART UNIT		PAPER NUMBER		
2611				
NOTIFICATION DATE		DELIVERY MODE		
08/22/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com

kascanla@qualcomm.com

nanm@qualcomm.com

### Office Action Summary

**Application No.**

10/821,585

**Applicant(s)**

KHANDEKAR ET AL.

**Examiner**

LEILA MALEK

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 May 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-34 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 04/09/2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-8508)  
4) ☐ Interview Summary (PTO-413)  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_  
Paper No(s)/Mail Date \_\_\_\_\_

**DETAILED ACTION*****Drawings***

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance. According to invention's disclosure (see paragraphs 0004, 0011, and 0034, Fig. 1 is a symbolic representation of the data detection for a hierarchical coded data transmission. Since this figure is not part of Applicants' invention it should be labeled as prior art.

***Response to Arguments***

2. Applicant's arguments with respect to claims 1-34 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-11 and 16-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains

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subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As to claims 1 and 16, Applicants fails to disclose how the second data stream is configured to augment the LLRs for the code bits of the first data stream. There is no indication by the Applicant in the disclosure of invention that the second data stream (i.e., enhancement data stream), is used to enhance the LLRs for the code bits of the first data stream.

4. Claims 12-15 and 31-34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As to claims 12 and 31, Applicants fail to disclose how the combination of second data stream and first data stream provided to the decoder, helps to enhance the decoded data stream.

5. Claims 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As to claim 28, Applicants fail to disclose how the combination of information from the adjustment unit and the the decision unit is used to form enhanced data symbol estimates. In Fig. 5, Applicants show that hard decisions output help to provide LLR adjustments in block 546, however using the combination of hard-decision output and the output

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of LLR adjustment unit is not disclosed by the Applicants in a way to enable one skill in the art to perform the same method.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 22-24 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As to claims 22 and 27, limitation: the second data stream is provided with the first data stream to produce an enhanced decoded data stream, is vague and indefinite. From the language of the claim, it is not clear whether the first and second data streams are combined to produce an enhanced decoded data stream, or the second data stream is just obtained from the first data stream to produce an enhanced decoded data stream.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5-11, 16-18, 20, 21, and 25, are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's background of invention, in view of Bjerke et al. (hereafter, referred as Bjerke) (US 2003/0103584).

As to claims 1 and 16, Applicants in the background of invention disclose a method of performing data detection in a wireless communication system (see paragraph 0004 and Fig. 1), comprising; detecting code bits of a first data stream based on received symbols for a data transmission (see block 172); computing a decoded base stream based on detected values (see block 182); estimating interference based on the decoded base stream (see block 174, block 174 only shows an interference canceller, but inherently interference must be first estimated and then cancelled); and enhancing the decoded base stream by subtracting (cancelling has been interpreted as subtracting) the estimated interference from the LLRs for the code bits of the first data stream to form a second data stream (see the output of interference canceller 174) configured to augment the LLRs for the code bits of the first data stream and augment the decoded base stream (in view of 112 first paragraph rejection of claims 1 and 12 (see above) this limitation has been interpreted as broad as possible) (see paragraph 0004). Applicants in the background of invention disclose all the subject matters claimed in claims 1 and 12, except that detecting code bits comprises deriving log-likelihood ratios (LLRs) for code bits of a first data stream based on received symbols for a data transmission. Bjerke, in the same field of endeavor, discloses a technique to detect and decode data transmitted in a wireless system (see the abstract and Fig. 4c). Bjerke further discloses that the detector computes the LLRs for each transmitted coded bit and obtains soft-decision symbols (see paragraph 0105). It would have been obvious to one of ordinary skill in the art at the time of invention to modify the background of

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invention as suggested by Bjerke to represent the detected symbols more conveniently (see Bjerke paragraph 0087).

As to claims 2 and 17, Applicants in the background of invention show (see Fig. 1) decoding the detected values for the code bits of the first data stream to obtain decoded data for the first data stream (see block 182); and re-encoding and remodulating (see block 184) the decoded data to obtain remodulated symbols for the first data stream, wherein the interference due to the first data stream is estimated based on the remodulated symbols (see block 174).

As to claims 3 and 18, Applicants in the background of invention further show the detected symbols are derived from the received symbols in real-time without buffering the received symbols (see Fig. 1).

As to claim 5, Bjerke discloses that quadrature phase shift keying (QPSK) is used for both the first and second data streams (see paragraphs 0009 and 0036). One principal advantage of QPSK modulation techniques is high spectral efficiency and low bit error rate (BER), therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Applicants' background of invention as suggested by Bjerke.

As to claim 6, Bjerke disclose deriving received symbol estimates based on the LLRs for the code bits of the first data stream, and wherein LLRs for code bits of the second data stream are derived based on the received symbol estimates and the estimated interference (see Fig. 4c). It would have been obvious to one of ordinary skill in the art at the time of invention to modify

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Applicants' background of invention as suggested by Bjerke to increase the performance of the system (see paragraphs 0005-0010).

As to claim 7, Bjerke discloses that deriving received symbol estimates includes forming two equations for each received symbol based on LLRs for all code bits of a data symbol carried in the received symbol for the first data stream, and wherein a received symbol estimate for the received symbol is derived from the two equations (see paragraphs 0105-0133).

As to claim 8, Bjerke discloses that the LLRs for the code bits of the first and second data streams are derived based on a dual-max approximation (see paragraphs 0010 and 0137). It would have been obvious to one of ordinary skill in the art at the time of invention to use dual-maxima approximation in the system to reduce the computational complexity of signal estimation.

As to claim 9, Bjerke further discloses deriving channel gain estimates for a wireless channel used for the data transmission, wherein the LLRs for the code bits of the first and second data streams and the interference due to the first data stream are derived with the channel gain estimates (see paragraphs 0089-0096). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Applicants' background of invention as suggested by Bjerke to increase the accuracy of data estimations.

As to claim 10, Applicants in the background of invention disclose that the first data stream is a base stream and the second data stream is an enhancement stream for a hierarchical coded data transmission (see paragraphs 0003-0004).



As to claim 11, Bjerke discloses that the wireless communication system utilizes orthogonal frequency division multiplexing (OFDM), and wherein the received symbols are from a plurality of sub-bands (see paragraph 0004). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Applicant's background of invention as suggested by Bjerke to take advantage of a higher spectral efficiency.

As to claim 20, Applicant in the background of invention discloses a method of performing data detection in a wireless communication system (see paragraphs 0003-0004 and Fig. 1), comprising: detecting code bits of a first data stream based on received symbols for a data transmission (see block 172); deriving uncoded ("uncoded" in view of lack of any further description by the Applicant has been interpreted as decoded) data symbol estimates for the first data stream based the detection results for the first data stream (see decoder 182); computing a decoded stream based on the detected symbols of the first data stream using a set of modules (see blocks 182 and 186); estimating interference due to the first data stream based on the uncoded data symbol estimates (see block 174); and detecting code bits of a second data stream based on the received symbols and the estimated interference (see detector 176); wherein the second data stream is provided to the modules (see decoder 186) to produce an enhanced decoded data stream. Applicants in the background of invention disclose all the subject matters claimed in claim 20, except that detecting code bits of a first and second data streams comprises deriving log-likelihood ratios (LLRs) for code bits. Bjerke, in the same field of

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endeavor, discloses a technique to detect and decode data transmitted in a wireless system (see the abstract and Fig. 4c, blocks 452a and 452b). Bjerke further discloses that the detector computes the LLRs for each transmitted coded bit and obtains soft-decision symbols (see paragraph 0105). It would have been obvious to one of ordinary skill in the art at the time of invention to modify the background of invention as suggested by Bjerke to represent the detected symbols more conveniently (see Bjerke paragraph 0087).

As to claim 21, Bjerke discloses that the uncoded data symbol estimates are derived by making hard decisions on the LLRs for the code bits of the first data stream (see paragraph 0161). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Applicants' background of invention as suggested by Bjerke to further remove the interference from the received signal.

As to claim 25, Applicants in the background of invention further show the detected symbols are derived from the received symbols in real-time without buffering the received symbols (see Fig. 1).

8. Claims 4, 19, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' background of invention and Bjerke, further in view of Maru (US 6,516,444).

As to claims 4, 19, and 26, Applicants' background of invention and Bjerke disclose all the subject matters claimed in claims 1, 16, and 20, except for storing the LLRs for the code bits of the first data stream in a buffer; and storing the LLRs of the code bits of the second data stream in the buffer by overwriting the

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LLRs for the code bits of the first data stream. Maru discloses a turbo decoder apparatus (see Fig. 9), wherein previous information LOG likelihood and extrinsic information LOG likelihood are alternatively stored in a priori memories 103-1 and 103-2 (see Fig. 1). Maru further discloses that when one memory is used for a read as a previous information LOG likelihood memory, the other memory is used for a write as an extrinsic information LOG likelihood memory. In the next cycle, the memory used as a previous information LOG likelihood memory is overwritten as an extrinsic information LOG likelihood memory, and the memory used as an extrinsic information LOG likelihood memory is used for a read as a previous information LOG likelihood memory. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Applicants' background of invention and Bjerke as suggested by Maru to reduce the number of buffers in the system by overwriting the recent information on the previous ones and make the system less costly.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEILA MALEK whose telephone number is (571)272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Leila Malek  
Examiner  
Art Unit 2611

/L. M./  
/Leila Malek/  
Examiner, Art Unit 2611

/Mohammad H Ghayour/  
Supervisory Patent Examiner, Art Unit 2611